



BESS LAID PLANS: BATTERY ENERGY STORAGE SYSTEMS BASICS

SUBJECT MATTER EXPERT



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As the Electrical Platform Manager, Kevin oversees the complete electrical supply chain team at SourceBlue. Kevin leverages his 40 years of industry experience and technical proficiency to assist project managers and engineers throughout SourceBlue. Additionally, Kevin offers design support to clients and design teams, drawing from his extensive experience in the field. The supply chain team plays a pivotal role in knowledge sharing through educational initiatives and collaborative meetings, benefiting both internal stakeholders at SourceBlue and external clients and designers.

Kevin specializes in subject areas such as battery energy storage systems, microgrids, and sustainable power generation options. He has extensive experience in power distribution systems with a focus on Mission Critical Applications. His experience in the design and support of critical system components and control systems enables Mr. Burke to bring a deep understanding of the underlying principles of the equipment as they apply to the overall system operation.

Battery Energy Storage Systems (BESS) are a subset of the Energy Storage Systems (ESS) category. In the broader scope, ESS are comprised of any type of system that stores energy for future use through chemical, electrochemical, thermal, or mechanical means.

BESS systems use batteries (electrochemical) to store energy from various sources; the utility grid, and/or renewables, for conversion back to electrical energy when required. When connected to renewable energy sources such as wind or solar, **BESS systems can provide stabilization and greater energy reliability by providing energy during times of energy uncertainty.** When connected to the utility grid the BESS can provide peak demand relief and peak shaving. BESS systems can discharge and recharge quickly which allows the BESS to provide support to the grid or to the client side when required.

BESS can also provide backup power if the utility or renewable sources are no longer providing the power required by the connected system. The battery runtime can vary with **typical storage durations from 2 to 10 hours** depending on the system design and requirements. For direct utility connections where BESS is used for demand relief or peak shaving, the typical runtime is commonly designed to be 4 hours or less.

BESS installations are rated in Watts (kilo, Mega, or Giga) and Watt hours (kWh, MW,h or GWh). The Watt rating indicates the power capacity of the BESS and the Wh rating defines the amount of energy the system can supply. The Watthour rating is the system rating multiplied by the runtime of the battery system. For example, a 3 MW system that can supply 4 hours of runtime would be rated at 12 MWh.

BESS COMPONENTS

Battery

The batteries most frequently used in a BESS are Lithium Ion which are available in different chemistries. VRLA and Nickel Cadmium batteries have also been used in the past but the Lithium Ion advantages of longer useful life, reduced weight, and energy density have swung the needle away from those other chemistries.

Battery System Enclosure

The batteries, monitoring, fire suppression, and control systems are housed in enclosures. Enclosure types and sizes vary depending upon the system rating and runtime required. For utility scales systems, the most common enclosures range in length from 20' to 53'. There are BESS providers that are moving toward modular battery cabinet designs that are self contained and do not require shipping container like housings.

Power Conversion Systems (PCS)

The PCS, also known as a Hybrid Inverter, is a bidirectional device that allows for AC power from the renewable or grid source to charge the batteries after conversion to DC power or, for DC power to flow from the batteries to the AC connection point for system consumption, after conversion through the inverter. The number of PCS units used in a system will depend upon the power capacity of the system.

System Transformer

The system transformer is connected to the PCS and is utilized to change the inverter voltage to match the voltage of the connected system.

System Management Platform

The energy management system monitors and controls the BESS. The flow of power to or from the BESS is monitored and controlled based upon system requirements and utility agreements. Battery health and status, ambient and battery temperature, smoke and hydrogen sensors are all monitored for system control and client interface. Fire suppression systems are monitored for alarms and health. These systems will connect to the local Fire and Emergency personnel.



BESS APPLICATIONS

- Renewable Energy installation, providing stabilization of the generated power during fluctuations in solar array or wind farm.
- Industrial applications, providing peak shaving, demand planning. BESS can also provide building-wide backup power to ensure industrial processes can continue without interruption.
- Utility Grid connection, provides additional reserve power and grid overload relief for utility companies during peak hours.
- Electric Vehicle or Mass Transit Electrification, provide demand charge relief and demand reduction on the grid for electric vehicle charging stations.

We invite you to take this journey to create the BESS Laid Plans for your facility. Please contact Kevin Burke at kpburke@sourceblue.com